



US009636020B2

(12) **United States Patent**
Flusberg et al.

(10) **Patent No.:** **US 9,636,020 B2**
(45) **Date of Patent:** **May 2, 2017**

(54) **LIVE BEING OPTICAL ANALYSIS SYSTEM
AND APPROACH**

(71) Applicant: **The Board of Trustees of the Leland
Stanford Junior University**, Palo Alto,
CA (US)

(72) Inventors: **Benjamin A. Flusberg**, Palo Alto, CA
(US); **Eric David Cocker**, Palo Alto,
CA (US); **Juergen Claus Jung**, Palo
Alto, CA (US); **Mark Jacob Schnitzer**,
Palo Alto, CA (US)

(73) Assignee: **The Board of Trustees of the Leland
Stanford Junior University**, Stanford,
CA (US)

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 0 days.

(21) Appl. No.: **14/322,517**

(22) Filed: **Jul. 2, 2014**

(65) **Prior Publication Data**

US 2015/0057549 A1 Feb. 26, 2015

Related U.S. Application Data

(63) Continuation of application No. 11/338,598, filed on
Jan. 24, 2006, now Pat. No. 8,788,021.
(Continued)

(51) **Int. Cl.**
A61B 5/00 (2006.01)
G01N 21/64 (2006.01)
(Continued)

(52) **U.S. Cl.**

CPC **A61B 5/0068** (2013.01); **A61B 5/0013**
(2013.01); **A61B 5/0059** (2013.01);
(Continued)

(58) **Field of Classification Search**

CPC ... **A61B 5/0068**; **A61B 5/0079**; **A61B 5/0064**;
A61B 5/0062; **A61B 5/0059**;
(Continued)

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,201,318 A 4/1993 Rava et al.
5,345,941 A 9/1994 Rava et al.
(Continued)

OTHER PUBLICATIONS

Fossum E. Digital camera system-on-a-chip. IEEE Micro
1998;18(3):8-15.

(Continued)

Primary Examiner — Long V Le

Assistant Examiner — Angela M Hoffa

(74) *Attorney, Agent, or Firm* — Crawford Maunu PLLC

(57) **ABSTRACT**

Analysis of live beings is facilitated. According to an
example embodiment of the present invention, a light-
directing arrangement such as an endoscope is mounted to a
live being. Optics in the light-directing arrangement are
implemented to pass source light (e.g., laser excitation light)
into the live being, and to pass light from the live being for
detection thereof. The light from the live being may include,
for example, photons emitted in response to the laser exci-
tation light (i.e., fluoresced). The detected light is then used
to detect a characteristic of the live being.

21 Claims, 6 Drawing Sheets

